the present disclosure. The split-ring resonator **7026** may be printed on a PCB board with an inner loop **7025** and an outer loop **7024**. The splint-ring resonator **7026** may be placed adjacent to the circuit **7016** of FIG. **260** to enhance its read range (e.g., the two planes defined by the two circuit's PCB boards may be parallel to each other).

[1291] Various alternatives and modifications can be devised by those skilled in the art without departing from the disclosure. Accordingly, the present disclosure is intended to embrace all such alternatives, modifications and variances. Additionally, while several embodiments of the present disclosure have been shown in the drawings and/or discussed herein, it is not intended that the disclosure be limited thereto, as it is intended that the disclosure be as broad in scope as the art will allow and that the specification be read likewise. Therefore, the above description should not be construed as limiting, but merely as exemplifications of particular embodiments. And, those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto. Other elements, steps, methods and techniques that are insubstantially different from those described above and/or in the appended claims are also intended to be within the scope of the disclosure.

[1292] The embodiments shown in the drawings are presented only to demonstrate certain examples of the disclosure. And, the drawings described are only illustrative and are non-limiting. In the drawings, for illustrative purposes, the size of some of the elements may be exaggerated and not drawn to a particular scale. Additionally, elements shown within the drawings that have the same numbers may be identical elements or may be similar elements, depending on the context.

[1293] Where the term "comprising" is used in the present description and claims, it does not exclude other elements or steps. Where an indefinite or definite article is used when referring to a singular noun, e.g., "a," "an," or "the," this includes a plural of that noun unless something otherwise is specifically stated. Hence, the term "comprising" should not be interpreted as being restricted to the items listed thereafter; it does not exclude other elements or steps, and so the scope of the expression "a device comprising items A and B" should not be limited to devices consisting only of components A and B. This expression signifies that, with respect to the present disclosure, the only relevant components of the device are A and B.

[1294] Furthermore, the terms "first," "second," "third," and the like, whether used in the description or in the claims, are provided for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances (unless clearly disclosed otherwise) and that the embodiments of the disclosure described herein are capable of operation in other sequences and/or arrangements than are described or illustrated herein.

What is claimed is:

1. A pump for pumping fluid, the pump comprising:

a tube platen;

a plunger configured for actuation toward and away from the tube platen when the tube platen is disposed opposite to the plunger;

a bias member configured to urge the plunger toward the tube platen;

an inlet valve upstream of the plunger configured for actuation between an occluding position and a non-occluding position;

an outlet valve downstream of the plunger configured for actuation between an occluding position and a non-occluding position;

an actuator mechanism configured to control the actuation of the plunger, the inlet valve and the outlet valve, wherein the actuator mechanism is configured to mechanically engage and disengage from the plunger to pump fluid toward a patient, wherein when the actuator mechanism is disengaged from the plunger, the actuator mechanism is configured to mechanically discharge the bias member such that the bias member acting upon the plunger is a sole force driving the plunger toward the tube platen, wherein the actuator mechanism is configured to engage the plunger to lift the plunger away from the tube platen to thereby mechanically charge the bias member, wherein the actuator mechanism comprises a cam shaft and a plunger cam coupled to the cam shaft configured to actuate the plunger;

a pressure sensor disposed adjacent to at least one of the inlet valve, the outlet valve, and the plunger;

a position sensor configured to estimate a position of the plunger; and

a processor coupled to the position sensor to receive the estimated position of the plunger therefrom, wherein the processor is configured to detect an anomaly based in part on the estimated plunger position when:

the inlet valve is in the occluding position,

the outlet valve is in the occluding position,

the actuator mechanism is mechanically disengaged from the plunger thereby making the bias member the sole source of actuation force of the plunger toward the tube platen, wherein the plunger cam is not in contact with a plunger-cam follower of the plunger when the plunger position is estimated; and

the bias member urges the plunger toward the tube platen,

wherein the processor is further coupled to the pressure sensor to receive a pressure signal from the pressure sensor, the processor is configured to, using the pressure signal, determine a downstream occlusion exists if a trough of the cycle of the plurality of cycles is greater than a lowest trough of all of the plurality of cycles by a predetermined threshold.

2. The pump according to claim **1**, wherein the processor is configured to detect a leak based on a rate of change of the estimated position of the plunger.

3. The pump according to claim **1**, the pump further comprising an ultrasonic sensor sensitive to gas in an infusion tube, the ultrasonic sensor located downstream of the plunger and configured communicate with the processor, wherein the processor is configured to distinguish between an upstream occlusion and a presence of air in the fluid using the ultrasonic sensor.

4. The pump according to claim **1**, the pump further comprising an ultrasonic sensor sensitive to gas in an infusion tube, the ultrasonic sensor located downstream of the plunger and configured communicate with the processor, wherein the processor is configured to determine a volume of air pumped downstream based on the plunger position when both the inlet and outlet valves occlude the infusion tube and on the sensed gas.

5. The pump according to claim **1**, wherein the tube platen is configured to hold an intravenous infusion tube.